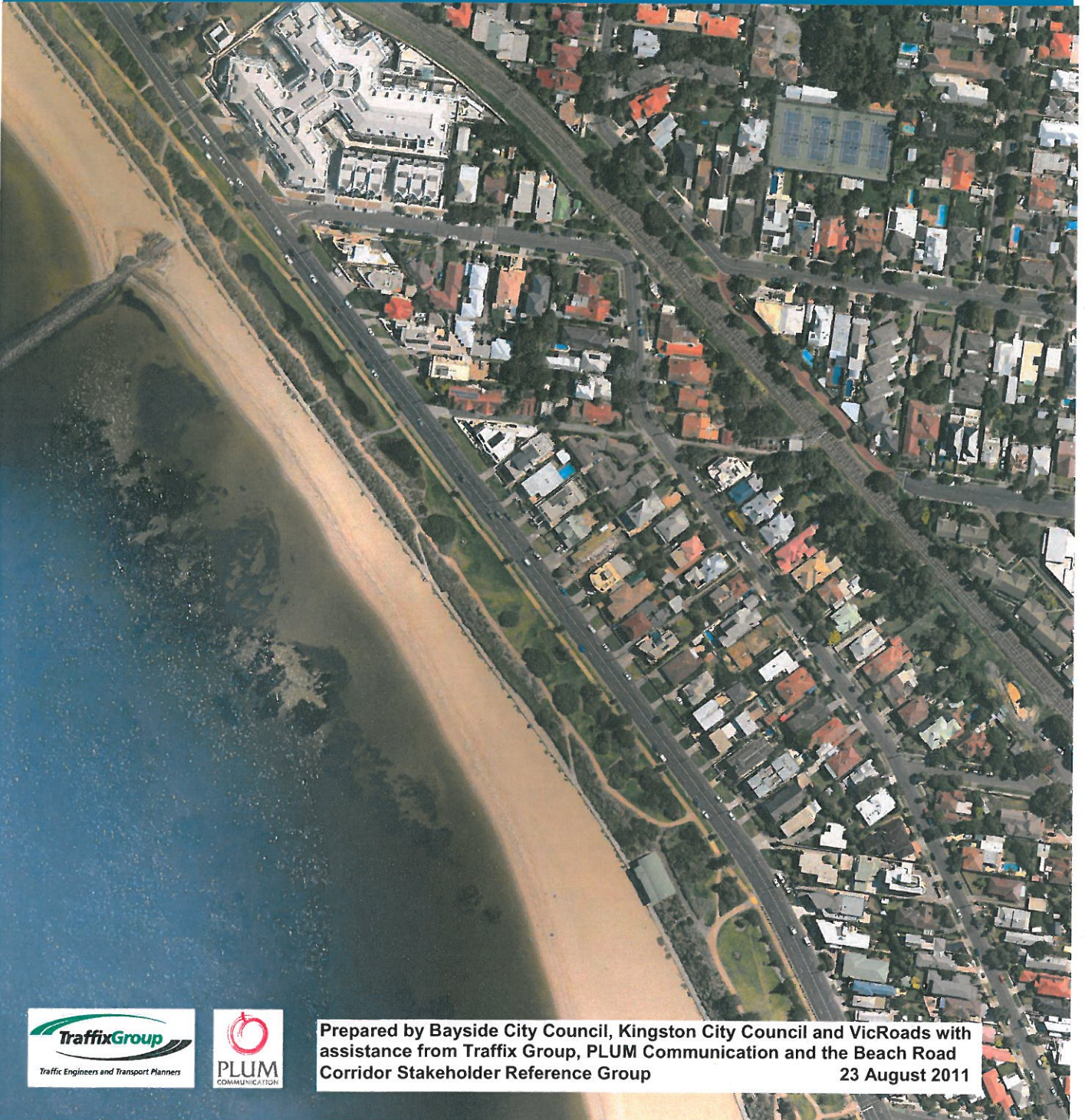




Beach Road Corridor Strategy

Metropolitan Route 33 Elwood to Mordialloc



Prepared by Bayside City Council, Kingston City Council and VicRoads with assistance from Traffix Group, PLUM Communication and the Beach Road Corridor Stakeholder Reference Group

23 August 2011

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Executive Summary

Role of Beach Road

The Beach Road Corridor (Metropolitan Route 33) is an arterial link between Mordialloc and Port Melbourne that generally follows the coastline. It serves multiple road users including pedestrians, commuter traffic, training and recreational cyclists, heavy vehicles and local traffic.

This Strategy covers the 19.2km section of the Beach Road Corridor between Head Street, Brighton and Nepean Highway, Mordialloc, incorporating St Kilda Street, The Esplanade and Beach Road. The Beach Road Corridor (from this point forward referred to as Beach Road) generally consists of a four lane undivided road with two through traffic lanes in each direction with the exception of an 800m section between Deauville Street, Beaumaris and Mundy Street, Mentone which consists of a two lane divided road with one dedicated through lane and an on-road bicycle lane in each direction.

Beach Road provides easy and convenient access to the Port Phillip Bay beaches, with a number of railway stations in close proximity to Beach Road including Brighton Beach, Hampton, Sandringham and Mordialloc. A shared bicycle and pedestrian path (the Bay Trail) generally exists on the beach side of Beach Road within the Bayside City Council section except for a missing section in Beaumaris between Cromer Road and Charman Road and a sub-standard section of path within Kingston between Charman Road and Foam Street.

Project Objectives

This Strategy identifies and prioritises a range of actions that will improve the overall safety for all users of Beach Road with a particular emphasis on motorists, cyclists and pedestrians. The key objectives of the Strategy include:

- Improve the management of local/regional traffic issues.
- Facilitate safe movement of vehicles, pedestrians, cyclists and other users.
- Divert freight/heavy traffic from Beach Road to the Nepean Highway.
- Promote Beach Road as a foreshore tourist boulevard.
- Identify a road hierarchy that protects the amenity of sensitive areas and reinforces the role of Beach Road as a scenic boulevard.
- Identify actions required to improve safety and access across Beach Road.
- Prepare an integrated strategy for the protection and improvement of Beach Road.
- Consider the impacts of the weekend 'No Stopping' trial along Beach Road

Traffic Issues

Traffic volumes on Beach Road range from 28,000 vehicles per day in the St Kilda Street section between North Road and South Road to 15,000 vehicles per day between Balcombe Road and Nepean Highway.

Weekend morning cyclist numbers along Beach Road are significantly greater than motor vehicles. Between 6:00am and 10:00am 7,510 cyclists were recorded compared to 2,326 motor vehicles over a weekend in September 2010.

Cyclists were present in approximately half of the crashes that occurred along Beach Road during the 5 year period between 2005 and 2009 as registered in the VicRoads Crashstats database. The site that experienced the most crashes in this period was in the vicinity of the roundabouts at Black Road where 25 crashes (7.5% of all crashes) occurred.

The section of Beach Road which had the highest crash rate is between Head Street and Grosvenor Street where 5.5 total crashes per km per year and the 2.1 cyclist crashes per km per year occurred.

The Strategy

The Beach Road Corridor Strategy includes a number of recommendations to address the objectives along the corridor, including:

- Investigate the potential to install Pedestrian Operated Signals (POS) between Normanby Street and Chelsea Street, south of Canterbury Place, north of Abbott Street and between Keys Street and Bodley Street.
- Investigate the potential to replace the Beach Road/Balcombe Road roundabout with a signalised intersection.
- Investigate modification to the lane configuration at the South Road intersection to minimise conflicts between bicycles and motor vehicles.
- Provide indented parking on the beach side near Hampton Beach and south of Balcombe Road/Bluff Street roundabout.
- Remove kerb outstands between Deauville Street and Mundy Street to provide increase road space for cyclists.
- Complete the missing section of the existing off-road shared path in Beaumaris between Cromer Road and Charman Road.
- Consider extending existing truck ban to include Saturday mornings.
- Investigate the potential to reduce speed limits.
- Improve bicycle signage.
- Investigate potential to introduce ticket parking along Beach Road.
- Increase policing and implement education programs to promote the cyclist code of conduct to all road users of Beach Road.

Investment Priorities

Initially a total of 19 projects with a total value of \$10.1 million were identified to address the overall safety issues along Beach Road.

Proposed short term projects include providing parking on the beach side near Hampton Beach, providing indented parking at the Beach Road/ Balcombe Road/ intersection, completing the missing section of shared path within Bayside, extending the existing truck ban, improving cyclist signage, ticket parking along Beach Road, introducing education programs, increasing policing of Beach Road and the installation of Pedestrian Operated Signals (POS) near Normanby Street.

In the medium term, potential projects include the installation of Pedestrian Operated Signals (POS) near Bodley Street, changes to the lane configuration at the South Road intersection, removal of kerb outstands between Deauville Street and Mundy Street, signalisation of the Warrigal Road intersection, improvements to cyclist signage along Beach Road and changes to the speed limit subject to the outcomes of a Statewide review.

In the longer term, potential projects include investigating the potential to install Pedestrian Operated Signals (POS) near Canterbury Place and Abbott Street and an investigation of the potential replacement of the roundabouts at Balcombe Road/Beach Road/Bluff Road and Nepean Highway/Beach Road with traffic signals.

All the projects identified as short term projects as well as the POS at Bodley Street are to be included in the Beach Road Corridor Strategy with the inclusion of funding over the next three to five years. Other projects are recommended for further investigation.

Introduction

General

Metropolitan Route 33 is a VicRoads arterial road which runs between Mordialloc and Port Melbourne adjacent to Port Phillip Bay. The subject section of Beach Road in this Strategy refers to the 19.2km section within the municipalities of Bayside and Kingston between Head Street, Brighton and Nepean Highway, Mordialloc. The road generally consists of a four lane undivided carriageway with two through traffic lanes in each direction with the exception of an 800m section between Deauville Street, Beaumaris and Mundy Street, Mentone. This section consists of a two lane divided road with one dedicated through lane and an on-road bicycle lane in each direction. Right turn lanes and pedestrian refuges are located in the median and kerbside outstands regularly occur through this section.

The speed limit along the Beach Road is 60km/hr with 40km/hr school zones located near St Bede's College and Mentone Girls Grammar. Heavy vehicle bans exist 8pm to 6am weeknights and between 1pm Saturday and 6am Monday over the weekend. A shared bicycle and pedestrian path (the Bay Trail) generally exists on the beach side of Beach Road except for a missing 700m section in Beaumaris between Cromer Road and Charman Road within the City of Bayside. There is also a section of path which is sub-standard within the Kingston City Council area between Charman Road and Foam Street

A map of Beach Road with the major intersecting roads is presented in Figure 1.

Key Objectives

This Strategy identifies and prioritises a range of actions that will improve the overall safety and amenity for all users of Beach Road with a particular emphasis on motorists, cyclists and pedestrians. The key

objectives of this Strategy are based on the Municipal Strategic Statement contained within the Bayside Planning Scheme which specifies a number of objectives that specifically relate to Beach Road. These objectives are also supported by Kingston City Council.

The objectives adopted for this Strategy are:

- Improve the management of local/regional traffic issues.
- Facilitate safe movement of vehicles, pedestrians, cyclists and other users.
- Divert freight/heavy traffic from Beach Road to the Nepean Highway.
- Promote Beach Road as a foreshore tourist boulevard.
- Identify a road hierarchy that protects the amenity of sensitive areas and reinforces the role of Beach Road as a scenic boulevard.
- Identify actions required to improve safety and access across Beach Road.
- Prepare an integrated strategy for the protection and improvement of Beach Road.
- Consider the impacts of the weekend 'No Stopping' trial along Beach Road



Lane configuration on Beach Road near Hampton Surf Lifesaving Club

Background Information

A number of documents and studies were reviewed as part of the development of this strategy.

These documents include:

- Bayside City Council Bicycle Strategy, prepared by David Lock Associate & PBAI Australia in 2003.
- Code of Conduct for Bike Riders, jointly published by VicRoads, Victoria Police and Safe Cycle.
- Code of Conduct for Training Cyclists, jointly published by Victoria Police, Triathlon Victoria, Cycling Promotion Fund, Cycle Sport Victoria and Cyclo Sportif Victoria.
- Cyclist Bunch Riding: A Review of the Literature. Melbourne, published by Monash University Accident Research Centre in 2009.
- Response to Bayside City Council Bicycle Strategy, prepared by Burridge, T., Lajbcygier, P. & Lema, M. in 2003.
- Route 33 (Elwood to Mordialloc) - Proposed Weekend Mornings 'No Stopping' Bans, prepared by GTA Consultants.

These documents contain a number of recommendations to improve the overall safety of travel along Beach Road. The recommendations have been grouped into three main perspectives: cyclist behaviour, motorist behaviour and engineering issues.

From the perspective of cyclist behaviour, recommendations included:

- Establish a cycling reference group.
- Continue to publish Code of Conduct for training cyclists.
- Increase police patrols.
- Implement education campaigns.

From the perspective of motorist behaviour, recommendations included:

- Improve driver's behaviour through educating drivers as to the rights of cyclists and the obligations of drivers.
- Encourage Victoria Police to act against aggressive vehicle drivers.
- Prohibit heavy vehicle activity on Beach Road during peak times.

From the perspective of engineering issues, recommendations included:

- Improve existing conflict points along Beach Road.
- Initiate weekend 'No Stopping' bans.
- Reduce the Beach Road speed limit from 60 km/h to 50km/h.

Role of VicRoads

VicRoads is responsible for traffic management along arterial roads in Victoria including Beach Road. In particular, VicRoads manages the road carriageway which can include traffic lanes, medians, refuges, pedestrian crossings, etc.

Role of Councils

Councils are responsible for managing local roads within their Council area. In addition, Councils represent the local community and manage road side elements along arterial roads including verges, nature strips, footpaths and kerbside parking. Councils are also responsible for managing parking on arterial roads.

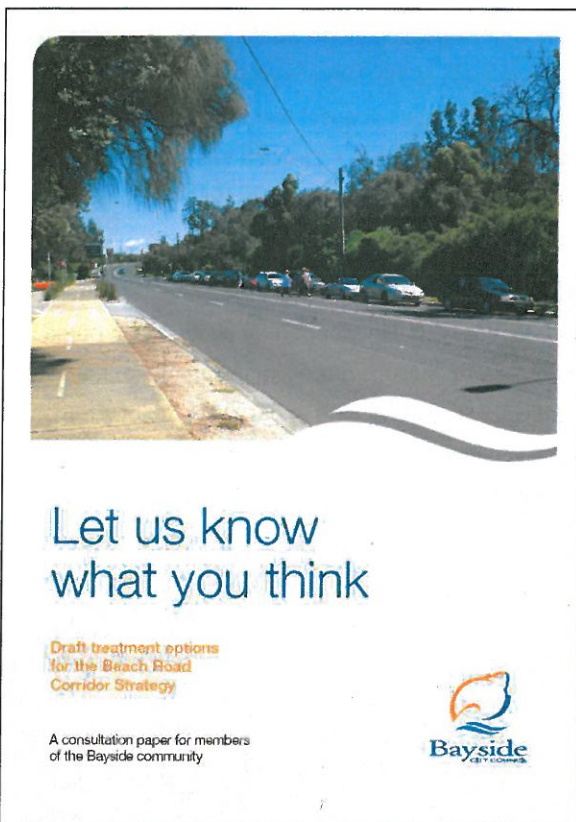
Project Steering Group

A Project Steering Group consisting of members from VicRoads, Bayside and Kingston Councils was setup to oversee the development of the strategy including a review at all key milestones.

Consultation and Community Engagement

Consultation and community engagement informing the Bayside residents of the development of the Strategy has taken on a number of forms.

- Establishment of a Stakeholder Reference Group
- Brochure placed on the Bayside Council website and distributed to Bayside residents living nearby Beach Road, presenting draft treatment options for Beach Road and inviting feedback via Council's website.



Brochure distributed to nearby landowners

Stakeholder Reference Group

The Stakeholder Reference Group (SRG) was established in November 2010, following a public call for nominations. The SRG met monthly until July 2011 and its role was to ensure the community, key stakeholders and specific interest groups were involved in identifying issues, considering data, research and other relevant considerations. Group members were invited to provide input and feedback, and seek the opinions of their members and community networks. The SRG comprised stakeholder representatives from the following groups.

- VicRoads
- Bayside City Council
- Kingston City Council
- Victoria Police
- Bicycle Victoria
- Cycling Victoria
- The Amy Gillett Foundation
- Sandringham and District Memorial Hospital
- Department of Transport
- Department of Sustainability and Environment
- Parks Victoria
- Commercial groups and
- Community representatives.

Continuing consultation has been conducted with the Project Steering Group and Stakeholder Reference Group members throughout the development of the Corridor Strategy.

'No Stopping' Trial

- Both Bayside and Kingston Councils have implemented a 12-month 'No Stopping' trial running from November 2010 to November 2011, which prohibits parking on both sides of Beach Road between 6:00am and 10:00am on weekends.
- The preparation of the Beach Road Corridor Strategy was a prerequisite of Bayside Council's support of the 12 month 'No Stopping' trial.
- The trial proposal received support from local police, the former Minister for Roads and Ports and VicRoads prior to the trial commencement in November 2010. Each of these parties asserted that the 'No Stopping' ban would improve the overall safety along Beach Road.
- The key principle of the weekend 'No Stopping' zones is to reduce vehicle conflicts and reduce driver/rider stress by effectively allocating the kerbside lanes as dedicated bicycle lanes.
- As a result of 'No Stopping' bans, parking is now prohibited along Beach Road between 6am and 10am on weekends.
- Monitoring of the 'No Stopping' trial in Bayside is being carried out by VicRoads, Bayside Council and the Stakeholder Reference Group. The methods adopted included video surveys and questionnaire surveys before and after the implementation of the "No Stopping" trial. Evaluation of the trial is to be completed in November 2011.
- Kingston Council is undertaking a separate evaluation of the 'No Stopping' Trial within Kingston which is also to be completed in November 2011. Input from VicRoads and the police is forming part of that assessment.

VicRoads have undertaken a number of measures to evaluate the impacts of the 'No Stopping' trial which were separate from the consultation undertaken as part of the Beach Road Corridor Strategy.

These measures included:

- A direct-mail survey was distributed to Bayside and Kingston residents affected by the trial. This survey was designed to measure resident's perception and experience of the trial with results due by June 2011.
- Aerial videoing of cyclist behaviour along Beach Road has been undertaken during the 'No Stopping' trial period.

Although evaluation of the weekend 'No Stopping' Trial is incomplete at the time of writing this strategy, preliminary results suggest that the impact of the trial has been positive with improvements in cyclists' behaviour and cyclists' experiencing a smoother ride along Beach Road.

The majority of members of the Stakeholder Reference Group indicated their support for continuation of the 'No Stopping' restrictions after completion of the trial. In particular Bicycle Victoria and Cycling Victoria have received significant support from their respective members.



Cyclist on Beach Road



Figure 1: Major intersecting roads along Beach Road

1. Route Function and Use

General

Beach Road is popular metropolitan route for a variety of user types including cyclists, pedestrians and vehicles. The existing usage of Beach Road by each road user type and its function in the VicRoads SmartRoads system are discussed as follows.

Local Access

Beach Road provides a convenient access to residential areas generally on the east side of the road. The major routes intersecting with Beach Road include North Road, South Road, Bay Road and Warrigal Road.

Beach Access

Beach Road provides easy access to Port Phillip Bay beaches. Off-street parking is provided at most of the beaches along Beach Road.

Training Cyclists

Beach Road is a popular route for training cyclists, particularly during weekends. Training cyclists regularly ride in groups, referred to as 'Bunch riding', and have received some negative publicity due to poor behaviour of some groups of cyclists who disobey road rules.

Recreational Cyclists

Recreational cyclists are accommodated along the Bay Trail which is a popular off-road shared path that generally extends along the foreshore side of Beach Road between Port Melbourne and Mordialloc apart from a missing 700m section between Cromer Road and Charman Road within the Bayside City Council area.

Commuter Traffic

Beach Road provides an alternative route for commuters to access the Melbourne CBD from Nepean Highway. There are fewer traffic signals along Beach Road than Nepean Highway, which sees the perception of a faster journey. In addition, it provides convenient access to railway stations including Brighton Beach, Hampton, Sandringham and Mordialloc.

Trucks

Trucks regularly use Beach Road during the day time, particularly between Head Street and South Road. Truck bans currently apply between 8pm and 6am Monday to Saturday, and between 1pm Saturday and 6am Monday. These bans restrict trucks of 4.5 tonnes or greater from travelling along Beach Road unless they are travelling to or from a destination on Beach Road.

Buses

There are four bus routes that use sections of Beach Road including the St Kilda Street section between Head Street and Bay Street, the Hampton and Sandringham section between South Road and Bay Road, the Beaumaris section between Keys Street and Charman Road and the Mentone/Parkdale section between Mentone Parade and Nepean Highway. However there is no bus route which operates continuously along Beach Road.

Pedestrians

Pedestrians are major users of Beach Road to access the beaches and the shared path located along the coast side of the road.

SmartRoads

SmartRoads is an approach used by VicRoads to manage competing interests for limited road space by giving priority use of the road to different transport modes at particular times of the day.

SmartRoads ensures that decisions about the operation of the road network support land use and transport planning and better consider the effects on the surrounding community, Melbourne's key activity centres and the environment.

SmartRoads uses a set of guiding principles to establish the priority use of roads by transport mode, time, and place of activity. These priority movements are then assigned to arterial roads across the network forming the SmartRoads Network Operating Plan.

Under SmartRoads, bicycles will be encouraged through further developing the bicycle network. The priority and type of bicycle routes are identified under Principal Bicycle Network (PBN).

SmartRoads has identified three main types of road use hierarchy along the subject section of Route 33 including bus priority route, other traffic route and pedestrian priority area.

The sections defined as bus priority route include:

- St Kilda Street between Head Street and Bay Street
- Beach Road between South Road and Bay Road
- Beach Road between Mentone Parade and Nepean Highway.

The sections defined as other traffic route include:

- St Kilda Street between Bay Street and Grosvenor Street
- Esplanade between Grosvenor Street and South Road

- Beach Road between Bay Road and Mentone Parade.

The sections defined as pedestrian priority areas include:

- Esplanade between Grosvenor Street and Chelsea Street
- Intersection between Bay Road and Station Street, Sandringham
- Intersection between Balcombe Road and Bluff Street, Black Rock.

The old PBN prepared in January 2006 indicates that:

- Beach Road was not included in the PBN.

The draft new PBN currently being prepared by VicRoads indicates that:

- Beach Road is included in the PBN.



Bay Trail along Beach Road

2. Traffic, Accidents & Road Conditions

Road Condition

The length of Beach Road within the study area generally consists of a four lane undivided road with two through traffic lanes in each direction with the exception of an 800m section between Deauville Street and Mundy Street.

The route has been divided into six sections based on common characteristics such as road cross section and adjacent land uses. The six sections are described below and presented in Figure 2.

- Section A (2.0 km). Head Street to Grosvenor Street, a four lane undivided road with two through traffic lanes in each direction. Residential properties are located on both sides through most of this section. There are multiple signalised cross intersections within this section.
- Section B (4.4 km). Grosvenor Street to Bridge Street, a four lane undivided road with two through traffic lanes in each direction. Almost continuous beach is located along the west side of the road.
- Section C (4.5 km). Bridge Street to Fourth Street, a four lane undivided road with two through traffic lanes in each direction. Shopping strips are located in the vicinity of Bay Road, Sandringham and Balcombe Road, Black Rock.
- Section D (3.4 km). Fourth Street to Cromer Road, a four lane undivided road with two through traffic lanes in each direction. This section is almost entirely residential apart from a small group of shops in Beaumaris. There are no signalised intersections along this section and cliffs generally exist along the beach side.
- Section E (1.2 km). Cromer Road to Mundy Street, a two lane divided road with one through lane and an on-road bicycle lane in each direction. Right turn

lanes and pedestrian refuges are located in the median and kerbside outstands also regularly occur through this section. In addition, traffic islands are provided at the intersections along this section. Cliffs exist along the beach side within this section of road. There is no off-road shared path along the majority of this section.

- Section F (3.9 km). Mundy Street to Nepean Highway, a four lane undivided road with two through traffic lanes in each direction. Continuous beach is located along this road section. Although a shared path exists in this section, it is not to the same standard as the path to the west and north of Cromer Road. Kingston Council is reviewing the off-road bicycle facility in this section.



Four lane undivided road along Beach Road through Sandringham



Two lane road with exclusive bicycle lanes near Deauville Street 12



Figure 2: Route sections

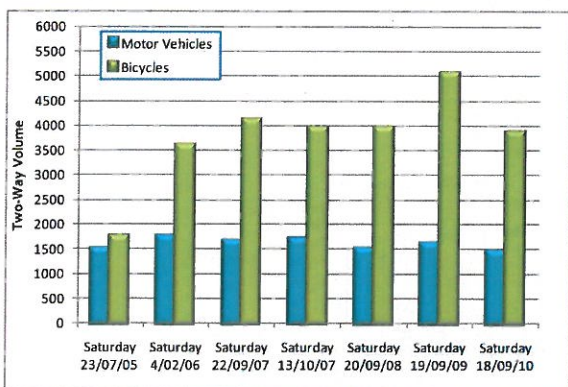
Traffic & Cyclist Volumes

VicRoads traffic volume data indicates that:

- Traffic volumes on Beach Road range from 28,000 vehicles per day between North Road and South Road to 15,000 vehicles per day between Balcombe Road and Nepean Highway.
- The proportion of heavy vehicles is approximately 6% of the total traffic volume, which is consistent with typical truck proportion on arterial roads in residential areas.

Traffic surveys commissioned by Bicycle Victoria were undertaken along Beach Road by GTA Consultants between 6:00am and 10:00am on Saturday 18th September 2010 and Sunday 19th September 2010 before the commencement of the weekend 'No Stopping' trial. The key findings of the surveys include:

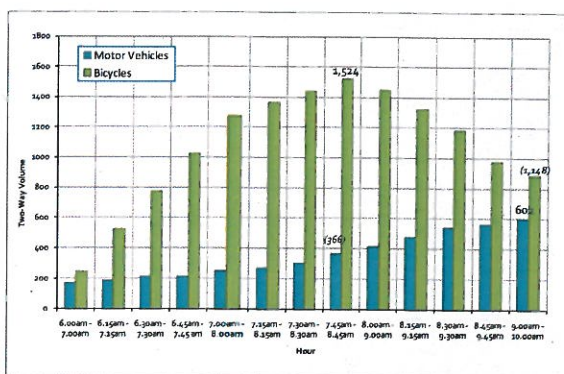
- There are significantly more cyclists than motor vehicles that travel along Beach Road between 6:00am and 10:00am weekend mornings (7,510 cyclists compared to 2,326 motor vehicles).



Source: GTA Surveys for Bicycle Victoria

- Cyclist numbers peak between 7:45am and 8:45am when there were 1,524 cyclists observed during the Saturday survey. Conversely, motor vehicle volumes are still growing between 9:00am and 10:00am when a peak of 602 vehicles was observed on the Saturday survey.

- The cyclist and motor vehicle counts have been undertaken over a weekend in September during each of the last four years since 2007. During this period neither the motor vehicle or cyclist volumes have changed significantly.



Source: GTA Surveys for Bicycle Victoria, Saturday Survey Results

Crashes

The crash data for the length of Beach Road between Head Street and Nepean Highway from the VicRoads Crashstats database for the five year period between 1st January 2005 and 31st December 2009 shows that:

- A total of 328 crashes occurred along Beach Road in the five year period including 159 crashes involving bicycles (48% of all crashes) and 12 involving pedestrians (4% of all crashes).
- The proportion of serious injury crashes was 9.9% higher on Beach Road than the average for the Melbourne metropolitan area.
- The proportion of serious injury crashes involving cyclists was 20.3% higher on Beach Road than the average for the Melbourne metropolitan area.
- The proportion of serious injury crashes involving pedestrians was 28.3% higher on Beach Road than the average for the Melbourne metropolitan area.

The most common crash types along Beach Road were rear end collisions and collisions with parked vehicles.

- The proportion of cyclists involved in crashes in Beach Road is significantly greater than the average for the Melbourne metropolitan area.
- 71.4% of the total accidents on Beach Road involving pedestrians occur at midblock sections or on sections of road between intersections.
- The individual site with the worst crash history is in the vicinity of the Balcombe Road roundabouts where there have been 25 accidents in the five year period, which alone accounts for 7.5% of all casualty accidents along Beach Road.
- The most problematic length is between Head Street and Grosvenor Street where the total accident rate is 5.5 accidents per km per year and the cyclist accident rate is 2.1 accidents per km per year, as shown in Figure 3.
- The areas where a large number of crashes occur are generally in the vicinity of major intersections, where there are adjacent activities or where there is substantial on-street parking.
- Of the crashes which occurred at intersections or pedestrian signals, the majority took place at roundabouts, with a crash rate of 18.5 accidents per roundabout.
- During the 6am – 10am time period on weekends, 78% of crashes occurring in this period involved cyclists.
- Lane side swipe crashes and vehicles losing control on the carriageway crashes were both over represented during the peak cycling period between 6am and 10am on weekends prior to the commencement of the 'No Stopping' Trial. Conversely, collisions with parked cars and rear end collisions were over represented at other times on weekends. 'Cross traffic' type crashes are most prevalent on weekdays.

- The number of crashes per year on Beach Road between 2005 and 2009 was steadily declining. The number of cyclists involved in accidents per year on Beach Road has been fluctuating but remaining relatively unchanged. A similar trend is shown in the Melbourne metropolitan area.
- On Beach Road, the more accident prone months of the year appear to be the warmer months (October – February) with the worst month being January with 10.1% of the total accidents. Conversely, the Melbourne metropolitan tends to experience the most crashes throughout the wetter months (May – August).
- Most crashes occur on Saturday and Sunday accounting for 21.3% and 18.3% of the week's total accidents on Beach Road respectively. Conversely, Thursday and Friday appear to be the worst days of the week for the Melbourne metropolitan area accounting for 15.3% and 16% of the week's total crashes respectively.
- 27% and 18.9% of all crashes involving cyclists occurred on a Saturday and Sunday on Beach Road respectively. This coincides with the high numbers of cyclists using Beach Road on Saturday and Sunday mornings.

The percentage of crashes occurring on Beach Road during the day time is higher than percentage of accidents occurring in the Melbourne Metropolitan Area during the same period of day

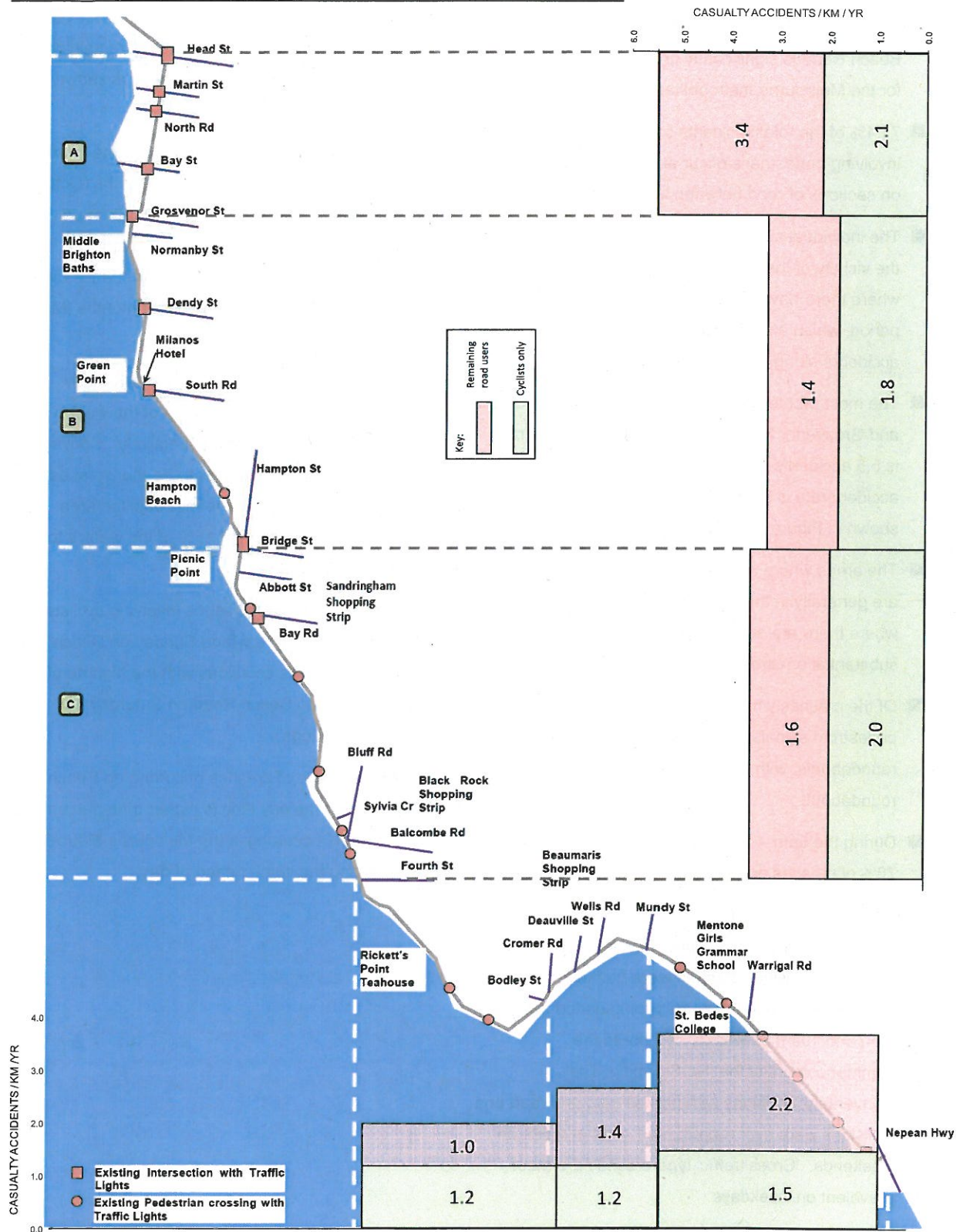


Figure 3: Accidents 2005 - 2009

3. Performance Standards

General

The design of proposed treatments on Beach Road will be developed based on the Austroad Standards, Austroads Guides and VicRoads Traffic Engineering Manual. The relevant standards used in the development of the proposed treatments are described below.

Traffic Lane Width

Austroads Guide to Road Design Part 3: Geometric Design, 2009 suggests that:

- Adoption of standard traffic lane widths of 3.5 m is desirable for urban arterial roads.
- Consideration may be given to reducing the traffic lane width to 3.3 m at locations where site constraints preclude the use of the desirable standard width.

Bicycle Lane Width

Austroads Cycling Aspects of Austroads Guides, 2001, suggests that generally

- Traffic lane widths should either be wide enough to allow the safe passage of a cyclist and a vehicle side by side (3.7 m or more) or narrow enough to permit the passage of a vehicle or bicycle only (3.0 m or less).
- Widths in between these two extremes create squeeze points and result in conflicts. Where traffic lanes are narrow, an off-road option should be considered for inexperienced and younger cyclists.
- The desirable lane width for an exclusive bicycle lane on a 60km/h road is 1.5 m. The acceptable range of widths is 1.2 m – 2.5m.

- Exclusive bicycle lanes should be provided on both sides of the road where possible so that use is in the same direction as motor vehicle traffic.

The number of cyclists using Beach Road at times cannot be accommodated in a standard 1.5m wide on-road bicycle lane.

Number of Lanes

- The typical one-way mid-block capacity for an undivided arterial road with interrupted flow is 900 vehicles per hour per lane.
- Once the traffic volumes exceed this number, an additional traffic lane is desirable.
- Typically a two-lane two-way road had a daily capacity of approximately 20,000 vehicles per day, whereas a four-lane two-way road has a capacity closer to 40,000 vehicles per day excluding on-street parking.

Pedestrian Crossing Facilities

VicRoads Traffic Engineering Manual Volume 1, 2010, Chapter 4 Pedestrian Facilities suggests that:

- For an arterial road, Pedestrian Operated Signals (POS), pedestrian refuges or medians would be the most appropriate pedestrian facilities.

Pedestrian Operated Signals may be provided in any of the following situations:

- Where for any hour the number of pedestrians crossing within 20m of the proposed site exceeds 100 and the number of vehicles which pedestrians cross exceeds 500 on an undivided road, or 1,000 where there is a median or refuge.

- A pedestrian (zebra) crossing would normally be justified but the operation of the crossing would interfere with the progression of vehicles to and/or from a nearby traffic signal installation and it would be practical for the operation of Pedestrian Operated Signals at or near the proposed site to be co-ordinated with the traffic signals.
- A pedestrian (zebra) crossing would normally be justified but would be hazardous for pedestrians due to conditions at the site (e.g. disabled or elderly pedestrians, high vehicle approach speeds, high traffic volume, poor visibility, etc).
- Where crash records indicate that two or more pedestrian casualty crashes have occurred in the last 3 years.

Lesser warrants are suggested for the installation of zebra crossing with flashing lights where the number of pedestrians crossing is reduced to 60 persons in one hour, however zebra crossings are not recommended treatments for primary arterial routes such as Beach Road. Accordingly a minimum number of 60 pedestrians crossing per hour would be an appropriate minimum for the installation of Pedestrian Operated Signals on Beach Road.

On-Street Parking

Australian Standard AS2890.5-1993 Parking Facilities Part 5: On-street parking indicates that

- The suggested width for a parallel parking space for cars and light commercial vehicles under normal conditions is 2.3m.
- The suggested length of an end indented parallel parking bay is 6.3m. The suggested length of an intermediate space is 6.3m.

Speed Limit

Australian Standard AS1742.4-2008 Manual uniform traffic control devices Part 4: Speed Controls and the VicRoads Traffic Engineering Manual Volume 1, 2010, Chapter 7 are the main references in relation to speed limits in Victoria.

The 'Safe Systems Approach' is used for the determination of speed limits in Victoria. A 60km/h posted speed limit is typically applied for undivided arterial roads in urban areas.

Reductions to speed limit may be appropriate based on the speed environment and crash history.

- Roadside development – Greater frequency of significant traffic generators than would be normally expected of the road function.
- Road characteristics – Actual presence of significant number of non-motor traffic such as bicycles and pedestrians on or in the vicinity of the roadway for significant periods and frequencies.
- Crash History – Adjustments to speed limits related to a history of a significantly higher than usual rate of casualty crashes.

Research shows that a reduction in the speed limit is likely to reduce both the number and severity of road crashes. The reduction in an urban speed limit from 60km/h to 50km/h has only a minimal impact on travel times but has major benefits as a result of the reduction in crash trauma and generally has a high level of community support. A Melbourne based study found that a reduction in the speed limit of 10km/h resulted in a 13.5% reduction in crashes during the AM peak period.

With the significant number of pedestrians and in particular cyclists who use Beach Road, and the higher

than typical crash rates, a reduction in the speed limit along Beach Road below 60km/h may be appropriate.

All members of the Stakeholder Reference Group have indicated their support for a reduction in the speed limit along Beach Road to 50km/h.

4. Key Transport Issues

Issues

Key management and development issues for each section of the Beach Road Corridor are:

A. Head Street to Grosvenor Street

- Existing peak period right turn ban signs at the northern signalised intersections are difficult to see.
- Narrow traffic lanes.
- Other than North Road, exclusive right turn lanes are not provided.
- Cyclist head start boxes are not provided to reduce conflicts between cyclists and left turning traffic.

B. Grosvenor Street to Bridge Street

- High turning traffic volumes at the entrance to the Middle Brighton Baths carpark opposite Normanby Street.
- High demand for pedestrians to cross Beach Road to access the Middle Brighton Baths.
- Large numbers of vehicles park on-street in some parts of this section which is in part to do with the ticketed parking that applies in the foreshore carparks compared to the free parking along Beach Road as well as parking due to adjacent businesses and residents.
- Kerbside parking on Beach Road restricts motorists' visibility near the Normanby Street intersection.
- Recent changes to incorporate a right turn at South Road intersection have introduced additional cyclist conflicts.
- Lack of off-street parking in area causing high demand for parking along Beach Road adjacent to Hampton Beach.

- Difficult for pedestrians to cross Beach Road between Green Point and Milanos tavern.
- Vegetation restricts visibility for traffic to exit Green Point carpark.
- High right turn demand into Were Street due to bridge over railway tracks further east on Were Street.
- No right turn lane into Were Street potentially causes motorists to stop rapidly and unexpectedly.
- Low side of road on outside of curve (adverse crossfall) between Gould Street and Were Street
- Parking on the east side of Beach Road near Small Street can be unexpected for southbound traffic during the PM peak.

C. Bridge Street to Fourth Street

- Confusing intersection configuration and linemarking at Balcombe Road roundabouts. Motorists accepting unsafe gaps to enter roundabout.
- Queuing from one roundabout regularly extends through other roundabout at Balcombe Road intersection.
- Large number of pedestrians crossing Beach Road to access football ground and marina between Georgiana Street and Bamfield Street.
- High right turn demand into Jetty Road without dedicated right turn lane.
- Potential for rear end collisions due to southbound traffic not expecting traffic to be stopping to turn right into Jetty Road.
- Poor visibility due to crest in road between Bayview Avenue and Arkaringa Crescent.

D. Fourth Street to Cromer Road

- No pedestrian crossing facilities despite pedestrian desire line between beach carpark and shops between Keys Street and Bodley Street.
- Poor visibility turning into and leaving Bodley Street due to parked vehicles, crest and various signage.
- Poor visibility leaving Keys Street due to parked vehicles, crest and curve.
- Kerb extension obstructs path of northeast bound cyclists between Keys Street and Bodley Street.
- High volumes of pedestrians due to popular beach and Rickett's Point Teahouse.
- Poor visibility due to crest in road between McGregor Avenue and Surf Crescent.
- Kerbside parking on Beach Road presents unexpected hazard beyond crest between McGregor Avenue and Surf Crescent.
- Large numbers of vehicles parked on-street near Rickett's Point Teahouse due to free parking there instead of ticket parking inside the Beaumaris life saving club and Rickett's Point Teahouse carparks.
- Numerous conflicts in the vicinity of Rickett's Point Teahouse due to on-street parking and multiple carpark accesses near Rickett's Point Teahouse.

E. Cromer Road to Mundy Street

- Missing section of shared path between Cromer Road and Charman Road.
- Kerb extensions between Deauville Street and Mundy Street create a safety hazard for cyclists.
- Narrow kerbside cycle lanes are difficult for large groups of cyclists to negotiate and can cause cyclists to spill over into adjacent traffic lane, causing irritation to motorists.

F. Mundy Street to Nepean Highway

- Motorists on south approach entering Nepean Highway/Beach Road roundabout at high speeds and motorists accepting unsafe gaps to enter roundabout.
- Large multilane roundabout at Nepean Highway difficult for cyclists to negotiate.
- Northbound motorists on Nepean Highway may be unsuspecting of roundabout at Beach Road as no other roundabouts exist further south on Nepean Highway.
- Significant traffic volumes turning in and out of Warrigal Road.
- Parking close to the Warrigal Road intersection restricts sight distance,
- Intersection angle at Warrigal Road and other nearby roads makes it difficult to see vehicles approaching from right if turning into Beach Road.
- Pedestrian access to beach opposite the Warrigal Road intersection difficult with no clear pedestrian crossing within 500m NW or SE.
- Poor visibility due to crest at Naples Road.
- Kerbside parking on Beach Road presents unexpected hazard beyond crest at Naples Road.
- Shared path not up to standard.

5. Management and Development Strategy

The Strategy

This Strategy aims to identify and prioritise a range of works and actions that will achieve the Strategy objectives and improve the overall safety of all users of Beach Road with a particular emphasis on motorists, cyclists and pedestrians. As a result, the following treatments have been identified for further investigation.

Pedestrian Operated Signals (POS)

Investigate installation of POS or other facilities at the following locations to provide safe crossing facilities for pedestrians subject to meeting pedestrian demand requirements:

- Between Normanby Street and Chelsea Street
- Between Keys Street and Bodley Street
- South of Canterbury Place
- North of Abbott Street.

Signalised Intersection

Replace busy roundabouts with signals and associated pedestrian crossings at the following intersections to improve overall safety and other operational issues:

- Balcombe Road/Bluff Street
- Nepean Highway.

Install signalised T-intersection at:

- Warrigal Road.

Road Cross Section

- Changes to lane configuration at South Road intersection to minimise conflicts between southbound bicycles and motor vehicles.
- Remove kerb outstands between Deauville Street and Mundy Street to widen the existing two lane section to provide increased width for cyclists.

Indented Parking

Provide indented parking:

- on beach side near Hampton Beach
- on east side south of Balcombe Road/Bluff Street roundabout.

Shared Path

- Complete missing section of the existing off-road shared path within Bayside between Cromer Road and Charman Road to provide a safe and continuous corridor for lower speed use by cyclists, pedestrians and other users. (Kingston City Council are separately reviewing the sub-standard section of path between Charman Road and Foam Street.)

Route Treatments

- Advocate to extend existing truck ban to include Saturday mornings to reduce the number of heavy vehicles using Beach Road during peak cycling times subject to agreement with truck industry
- Consider part-time or permanent 50km/hr speed limit along Beach Road to reduce the frequency and severity of crashes.
- Consider temporary or permanent bicycle route signage along Beach Road to increase awareness of high volumes of cyclists using the route.
- Introduce ticket parking or other restrictions along Beach Road to encourage use of off-street parking rather than on-street parking. This treatment would be adopted in locations nearby existing foreshore carparks where there is significant on-street parking occurring along Beach Road.
- Increase policing of Beach Road to supervise motorist and cyclist behaviours.

- Contribute to existing education programs being run by Bikes Victoria and Cycling Victoria,
- Increase distribution and promotion of the existing *Cycling Code of Conduct* and *Code of Conduct for Training Cyclists* documents within the local area, as found on the VicRoads internet page, and display these documents prominently in local bicycle shops:
- Advocate for the inclusion of 'Cycling Etiquette' to be included in future versions of the Cycling Code of Conduct document for cyclists to be considerate of their surroundings and reduce the volume of conversations while riding through residential areas in the early hours of the morning.

6. Investment Priorities

Initial Projects

A total of 19 projects with a total cost of \$10.1 million were identified initially to address the safety concerns and improving other overall issues along Beach Road. The projects have been divided into short-term, medium-term and long-term projects subject to project evaluation and funding. Funding of \$1.5 million has been allocated for Bayside Council in relation to the Beach Road Corridor Strategy over an initial 3 year period including \$500,000 for completion of the existing shared path. In addition to the Corridor Strategy, funding of \$250,000 per year has been allocated in the Bayside Council program to seal and upgrade the beachside carparks.

A set of evaluation criteria were developed to assess the projects. The criteria included the estimated cost of the treatment, associated impact on the safety of road users, existing traffic conditions, attractiveness to road users, environment, parking and local businesses. For every indicator, a fixed weighting was given depending on its importance in the Corridor Strategy. Higher weightings were given to the safety, environment and cost related issues. In addition to the weightings, a rating between -3 and 3 was given to each indicator, depending on the level of impact, problem significance and cost. Ratings varied between each treatment depending on its associated impact. The product of the rating and weighting of one indicator is the indicator's individual score. The project score is the total score of all the individual scores of each indicator.

The initial projects and their corresponding project scores are presented in Table 1 and the locations of proposed works are illustrated in Figure 4.

Community Views

A questionnaire was distributed to the Bayside residents living nearby Beach Road and placed on Bayside Council's website to collect views on the proposed treatments. A total of 258 questionnaires were collected. Respondents were able to comment on as many or as few of the proposed treatments that they wished as well as the 'No Stopping' trial. The key findings of the questionnaire were as follows:

- The majority of respondents commented on the weekend 'No Stopping' trial along Beach Road with the majority (76%) being supportive of the treatment.
- Apart from the 'No Stopping' trial, two of the treatments receiving significant comment were the truck ban extension and the speed limit reduction. The support rate for the truck ban extension was very high with 92% of respondents who raised this issue supporting it. The level of support for the speed limit reduction was relatively low compared to other treatments, with only 64% of respondents who raised this issue supporting the treatment.
- There was generally only limited support for the proposed pedestrian operated signals with the support rate generally less than 65%. The only exception was the proposed pedestrian signals in Beaumaris between Bodley Street and Keys Street which received 77% of responses in support.
- The indented parking treatments at Hampton Beach and Black Rock were both raised by a relatively high number of responses and both had a significant majority in support (88% support for Hampton and 85% support for Black Rock). Safety issues at the existing roundabouts at Black Rock were also raised by a similar number of responses and attracted an 85% support rate for safety improvements.

- The highest level of support (96%) was received for changing the cross section of Beach Road between Deauville Street and Mundy Street to provide more space for cyclists, although this issue was raised by fewer respondents than the speed limit change and a number of the other treatments,
- The remaining treatments were raised by a relatively low number of responses, although those that did raise these treatments were generally supportive.

Section	Treatment No.	Treatment Description	Estimated Cost (\$)	Project Score
Short Term				
B Grosvenor St to Bridge St	-	Ban right turn and through movements out of Normanby Road (Already implemented)	-	-
B Grosvenor St to Bridge St	4	Indented parking on beach side near Hampton Beach	\$240,000	25.5
D Fourth St to Cromer Rd	7	Indented parking south of Balcombe Road/Bluff Street roundabout	\$380,000	22.5
E Cromer Rd to Mundy St	9	Complete missing section of the existing off-road shared path in Beaumaris between Cromer Road and Charman Road	\$500,000	20.0
Entire Route	15	Improved signage along Beach Road to highlight use of road by cyclists	\$130,000	13.5
Entire Route	16	Install ticket machines to encourage use of foreshore carparks ahead of Beach Road	\$0	-
Entire Route	17	Education programs, Cycling Code of Conduct and Cycling Etiquette	\$100,000	21.0
Entire Route	18	Increased policing of Beach Road	\$0	16.0
A Head St to Grosvenor St	1	POS between Normanby Street and Chelsea Street	\$290,000	6.5
Sub-Total			\$1,640,000	
Medium Term				
B Grosvenor St to Bridge St	3	Changes to lane configuration at South Road intersection.	\$280,000	13.0
D Fourth St to Cromer Rd	8	POS between Keys Street and Bodley Street.	\$280,000	14.0
E Cromer Rd to Mundy St	10	Remove kerb outstands between Deauville Street and Mundy Street	\$770,000	5.0
F Mundy St to Nepean Hwy	11	Investigate the installation of signalised intersection at Warrigal Road intersection	\$710,000	14.0
Entire Route	13	Negotiate with truck operators/industry to extend existing truck ban to include Saturday mornings	\$60,000	11.5
Entire Route	14	Develop business case for submission to VicRoads to reduce speed limit to 50km/h	\$30,000	19.5
Sub-Total			\$2,130,000	
Long Term				
A Head St to Grosvenor St	2	POS South of Canterbury Place, subject to metering warrants	\$290,000	9.0
B Grosvenor St to Bridge St	5	POS north of Abbott Street, subject to metering warrants	\$300,000	3.0
D Fourth St to Cromer Rd	6	Replace roundabouts with signals at Balcombe Road/Bluff Street	\$1,730,000	21.0
F Mundy St to Nepean Hwy	12	Replace roundabout with signals at Nepean Highway	\$1,410,000	25.0
Sub-Total			\$3,730,000	

Note: A 3 year program for short-term projects is presented in Table 3.

Table 1: Proposed initial projects

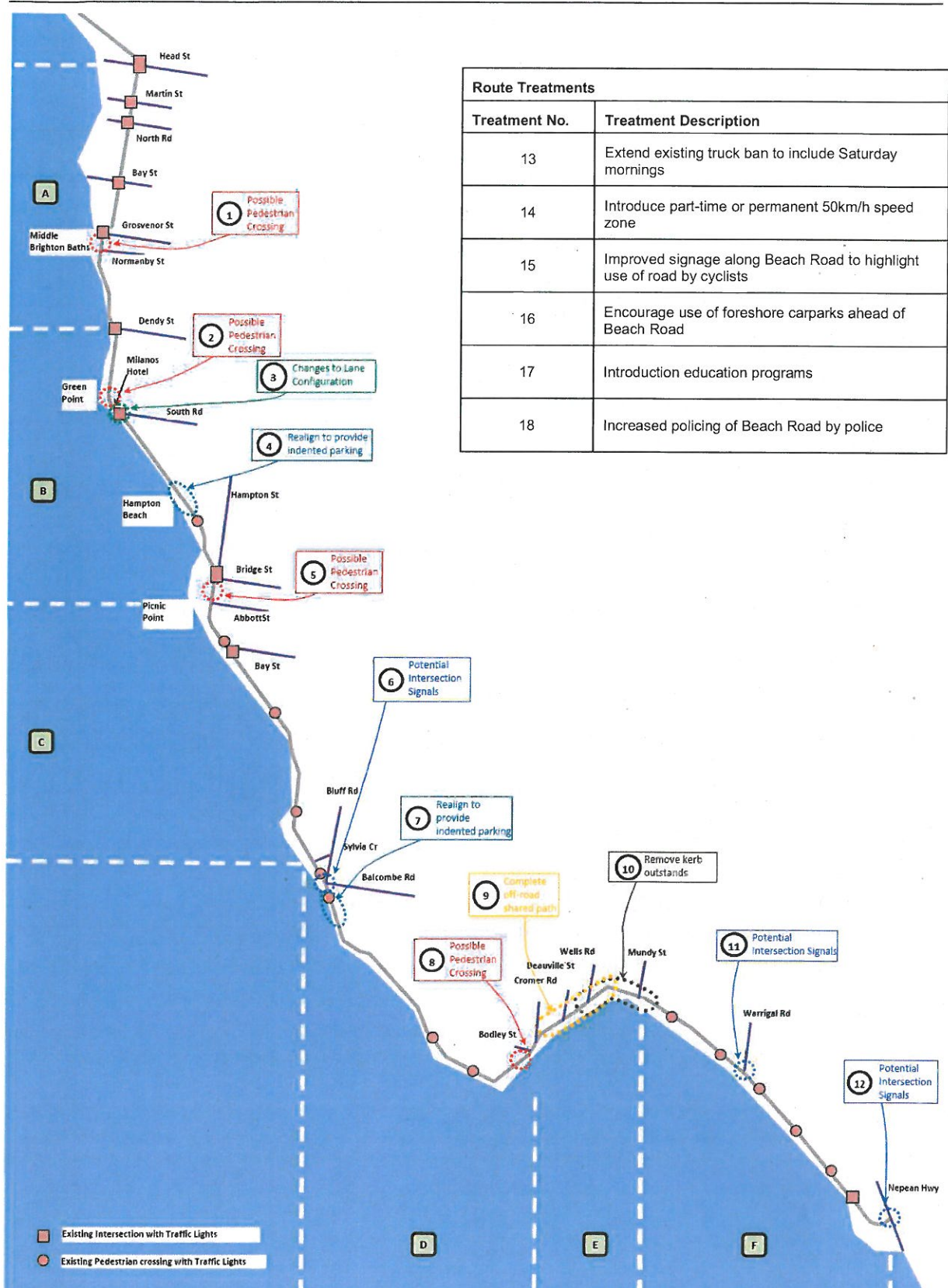


Figure 4: Proposed works on Beach Road

Final Projects

Each of the projects identified in this Strategy have been considered by VicRoads and Bayside and Kingston Councils in relation to how they align to Council priorities and relevant VicRoads programs.

All of the treatments considered as short-term priorities with the exception of the installation of ticket machines and increased policing in addition to the set of Pedestrian Operated Signals near Bodley Street are considered acceptable by VicRoads and the relevant Council for inclusion in the final document to be submitted to the Minister for Roads for funding.

The remaining treatments, whilst not included in the submission to the Minister, will still be considered by VicRoads and Councils for future funding opportunities subject to further investigations. The projects required for further investigation and the associated comment from the Councils and VicRoads are presented in Table 2.

In addition, the \$1.5 million funding allocated for the Corridor Strategy is to be used for the short-term projects over a 3 year period and the corresponding yearly fund allocation is presented in Table 3. In addition, the remaining medium-term project included in the Corridor Strategy is presented in Table 4.

Section	Treatment No.	Treatment Description	To be Submitted to Minister (Y/N)	Comment
Short Term				
B Grosvenor St to Bridge St	-	Ban right turn and through movements out of Normanby Road (Already implemented)	-	-
B Grosvenor St to Bridge St	4	Indented parking on beach side near Hampton Beach	Y	-
D Fourth St to Cromer Rd	7	Indented parking south of Balcombe Road/Bluff Street roundabout	Y	-
E Cromer Rd to Mundy St	9	Complete missing section of the existing off-road shared path in Beaumaris between Cromer Road and Charman Road	Y	-
Entire Route	15	Improved signage along Beach Road to highlight use of road by cyclists	Y	-
Entire Route	16	Install ticket machines to encourage use of foreshore carparks ahead of Beach Road	N	Ticket machines are a responsibility for Council and will not attract funding from VicRoads
Entire Route	17	Education programs, Cycling Code of Conduct and Cycling Etiquette	Y	-
Entire Route	18	Increased policing of Beach Road	N	Resource allocation for policing is a matter for Victoria Police
A Head St to Grosvenor St	1	Pedestrian signals between Normanby Street and Chelsea Street	Y	-
Medium Term				
B Grosvenor St to Bridge St	3	Changes to lane configuration at South Road intersection, subject to the re-opening of the New Street railway crossing.	N	To be further investigated as part of the project to re-open New Street rail crossing.
D Fourth St to Cromer Rd	8	Pedestrian signals between Keys Street and Bodley Street.	Y	-
E Cromer Rd to Mundy St	10	Remove kerb outstands between Deauville Street and Mundy Street	N	Kingston Council will review all safety issues at this location before this treatment can be further considered.
F Mundy St to Nepean Hwy	11	Investigate the installation of signalised intersection at Warrigal Road intersection	N	Kingston Council does not view this treatment as a high priority.
Entire Route	13	Negotiate with truck operators/industry to extend existing truck ban to include Saturday mornings	N	Initial discussions suggest that Commercial Motor Vehicles Group will not support this recommendation.
Entire Route	14	Develop business case for submission to VicRoads to reduce speed limit to 50km/h	N	Project subject to statewide review of speed zones.
Long Term				
A Head St to Grosvenor St	2	Pedestrian signals south of Canterbury Place, subject to metering warrants	N	Not supported due to low pedestrian volume.
B Grosvenor St to Bridge St	5	Pedestrian signals north of Abbott Street, subject to metering warrants	N	Not supported due to low pedestrian volume.
D Fourth St to Cromer Rd	6	Replace roundabouts with signals at Balcombe Road/Bluff Street	N	Number of crashes insufficient to warrant expenditure under VicRoads Road Safety Program
F Mundy St to Nepean Hwy	12	Replace roundabout with signals at Nepean Highway	N	Kingston Council's preference is to retain roundabout to slow traffic on approach to Mordialloc shopping area

Table 2: Commentary on suggested projects

Treatment No.	Treatment Description	Estimated Cost (\$)			
		Year 1	Year 2	Year 3	Total
1	POS between Normanby Street and Chelsea Street	-	\$290,000	-	\$290,000
4	Indented parking on beach side near Hampton Beach	-	\$240,000	-	\$240,000
7	Indented parking south of Balcombe Road/Bluff Street roundabout	-	-	\$380,000	\$380,000
9	Complete missing section of the existing off-road shared path in Beaumaris between Cromer Road and Charman Road	\$500,000	-	-	\$500,000
15	Improved signage along Beach Road to highlight use of road by cyclists	\$65,000	\$65,000	-	\$130,000
17	Education programs	\$40,000	\$30,000	\$30,000	\$100,000
Sub-Total		\$605,000	\$625,000	\$410,000	\$1,640,000

Table 3: Beach Road Corridor Strategy 3 Year Program for Short-term Projects seeking funding from Minister for Roads

Section	Treatment No.	Treatment Description	Estimated Cost (\$)	Project Score
Medium Term				
D Fourth St to Cromer Rd	8	POS between Keys Street and Bodley Street.	\$280,000	14.0
Sub-Total			\$280,000	

Table 4: Beach Road Corridor Strategy Medium-term Projects